

C-AD OPERATIONAL PROCEDURES MANUAL

TPL 03-09 OPERATIONS FOR E963 -- PROTON RADIOGRAPHY

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Associate Chairman for Safety Date

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TPL 03-09 OPERATIONS FOR E963 -- PROTON RADIOGRAPHY

1.0 Purpose

- 1.1 The purpose of this procedure is to provide Main Control Room (MCR) Operators, CAS (Collider Accelerator Support) personnel, and Radiological Control Technicians (RCT) instructions to deal with the special conditions that will arise during search and secure, during controlled access in the U downstream enclosure, and at the start of operation for E963.

2.0 Responsibilities

2.1 RCTs are responsible for:

- 2.1.1 performing surveys of the U downstream enclosure after an exposure and prior to allowing experimenters or other workers access. Surveys may be waived after an exposure baseline is established. The RCT may be required to sample the air in the Z line if required by the Rad Con Division Representative
- 2.1.2 conforming with the changes to procedure outlined in the Precautions section 4.0 below

2.3 MCR Operators and CAS personnel are responsible for

- 2.3.1 remotely controlling access to the U downstream enclosure
- 2.3.2 sweeping the U downstream enclosure free of personnel.
- 2.3.3 conforming with the changes to procedure outlined in the Precautions section 4.0 below

2.4 Operations Coordinators are responsible for

- 2.4.1 permitting access to the U downstream enclosure as required
- 2.4.2 reviewing the Gate Log Sheets after an access is completed and
- 2.4.3 conforming with the changes to procedure outlined in the Precautions section 4.0 below.

3.0 Prerequisites

- 3.1 The target group for this procedure is MCR operators and coordinators, CAS personnel, and RCTs.
- 3.2 The training method requires that the target group (3.1 above) read and sign this procedure.
- 3.3 The minimum number of persons required to be trained before this procedure may be used is four, one RCT, one Operations Coordinator, one CAS technician, and one MCR operator.
- 3.4 For emergency situations, CAS group members shall carry a zero key to enter U downstream after PASS is set to Restricted Access.
- 3.5 E963 collaborators have completed the required training and are enrolled in the hand-reader identification system database.
- 3.6 The Liaison Physicist(s) for the U line is responsible to ensure that the E963 test object is not inserted during U line setup with beam.
- 3.7 Access Controls Group has enabled use of hand reader and keytree in 919H
- 3.8 The 20 degree bend – pswarc20 – is RS LOTO by the Liaison Physicist. The U line berm remains secured.
- 3.9 The AGS A20 current transformer interlock, used to limit the number of protons in the U line is operational – [C-AD TPL 03-06 “Temporary Procedure to Limit the number of P⁺ in the AtR Transfer Line”](#).

4.0 Precautions

- 4.1 This Temporary Procedure authorizes the temporary modification of practices found in other OPM procedures. This procedure, while it is used, shall supercede the paragraphs of the procedures named below.
 - 4.1.1 C-AD OPM 4.1 "C-AD Complex Access Control Procedures for Primary Beam Enclosures" paragraph 4.3 is waived. Given the 4×10^{11} protons per bunch and single bunch exposures, no cooldown time is required at the discretion of the Radiological Control Division Representative.

- 4.1.2 C-AD OPM 4.1 "C-AD Complex Access Control Procedures for Primary Beam Enclosures" paragraph 5.2.1.10 may be waived. U downstream will be posted as a radiation area. Entrants will still be required to fill out the "Contamination Area and High Radiation Area Sign-Off List" for each entry in order to determine a baseline exposure.
- 4.1.3 C-AD OPM 4.56 Att. ae "U Downstream Sweep Checklist" -- the first line of the prerequisites is changed from two to three persons required to perform the sweep. The third person shall be a "Q" cleared experimenter who will shroud the object under test before the sweepers enter the Z line. See attachment 8.1 to this procedure. **IF the object is not present the third sweeper is not necessary.**
- 4.1.4 Attachment 8.1 will supercede OPM Att 4.56.ae "U Downstream Sweep checklist during operation for E963.
- 4.1.5 OPM 4.1 paragraph 5.2.2.2 is modified to allow MORE than one entrant to enter at a time. TWO users may "piggyback" during E963 Operation. A third user may piggyback if the Operations Coordinator approves. Every entrant must carry a CA key obtained from the key tree.
- 4.1.6 [OPM Att 4.1.f "CA Gate Security Log Sheet for Remote Access"](#) may be used at gate UGE3 in spite of the fact that the gate is not listed on the log sheet as one of the allowed gates.
- 4.1.7 [OPM 4.44 Operation of PASS](#), paragraph 5.1.10 (Remote Control Access for specified RHIC gates) will apply to gate UGE3
- 4.2 The hand reader in building 919H will be used to release Controlled Access (CA) keys from a keytree next to the hand reader. The keytree is an extension of the Udownstream key tree at MCR_2-3. Remote Access for UGE3 will function exactly as a normal PASS remote access except for the fact that the CA keys will be dispensed in building 919H (CA key is **not** the normal EB005 key). UGE3 is reset, as usual, at MCR_2 using the AGS PanelView and the appropriate SweepReset (EB004) key.

5.0 Procedures

5.1 Before beam operations begin for E963

5.1.1 The Liaison Physicist (LP) shall apply RS LOTO to the 20 degree bend

power supply pswarc20.

- 5.1.2 The W, X, and Y lines and the U line berm will remain secured during operation for E963.
- 5.1.3 The Liaison Engineer shall place “soil coupons” as directed in order to monitor soil activation.
- 5.1.4 The AGS A20 Current Transformer intensity interlock will remain active to limit the number of particles in the U line. [Temporary Procedure 03-06– C-AD TPL 03-06 “Temporary Procedure to Limit the number of P⁺ in the AtR Transfer Line”](#) will remain in effect.
- 5.1.5 During the “tune-up” phase for E963, the U line LP shall ensure that losses on the WD1 magnet, during routine operation for E963, will be less than three percent (3%) of the incident beam.
- 5.1.6 E963 collaborators have been trained in the operation of the hand reader and have been entered in the hand reader data base. See C-A OPM [4.75 “Entry Procedure for the Proton Radiography Experiment using the ID3D-R Hand Reader”](#)

5.2 Sweeping U downstream

- 5.2.1 The OC shall have the U downstream enclosure searched and swept free of personnel as required.
- 5.2.2 Operators or CAS personnel shall use attachment 8.1 to TPL 03-09 Temporary U downstream Checklist. New procedure steps are underlined.

Note:
C-AD OPM Att 4.56.ae “Udownstream Sweep Checklist shall not be used

- 5.2.2.1 The temporary sweep checklist requires that a third person, a “Q” cleared member of the E963 collaboration, be present to shroud the test object, if the sight-classified test object is exposed to view.

5.3 Access to U downstream

- 5.3.1 Before an access to U downstream, the OC shall order the critical devices (psuarc4 and SMH10) turned off before switching the enclosure to Controlled Access.

- 5.3.2 Following concurrence by the Radiological Control Division Representative, the OC need not order an RCT survey before an access. However, initially, RCT surveys shall be required for each entry.
- 5.3.3 U downstream is not posted as a High Radiation Area -- entrants are still required to fill out the Contamination Area and High Radiation Area Sign Off List in order to establish a baseline exposure history.

Note:
E963 collaborators must appear in the hand reader database in order to be able to access the gate under Remote Access Conditions.

- 5.3.4 The OC shall not permit an access to U downstream to take place without
- 5.3.4.1 first contacting E963 to inform them that an access will be made, and
- 5.3.4.2 a member of the E963 collaboration being present as part of the access team, if they so require.
- 5.3.5 REMOTE CONTROL ACCESS through UGE3 (Actions in the MCR)

Note:
Conventional access according to C-AD OPM 4.1 may be used to access UGE2 or UGE3 at any time. IF one of the two cameras at a gate fails or another critical component of the RCA system fails, THEN a conventional access following OPM 4.1 shall be used instead.

- 5.3.5.1 Operator shall turn off critical devices and set the U downstream zone to the CA state
- 5.3.5.2 The Operator shall fill out the header of the gate log sheet used for this procedure ([C-AD OPM Attachment 4.1.f](#))

Warning:
EVERY person that enters an enclosure under remote control access MUST have a CA key on their person.

- 5.3.5.3 Follow [OPM 4.44 Operation of PASS](#) paragraph 5.1.10 to conduct the remote access as if it were an access to a RHIC interaction region. Use [OPM Att 4.1.f for the gate log sheet](#).

Keep in mind the following exceptions:

- 5.3.5.3.1 The UGE3 outer gate video is only available on TV channel 12. UGE3 inner gate video is available on channel 11.
- 5.3.5.3.2 Use TV channel 19 to assure yourself all keys are returned.
- 5.3.5.3.3 The hand reader will identify, to the operator at MCR_7, which experimenter has removed a CA key. Use the IrisScannerLog – the same application used to determine to whom the Iris scanner released a key.
- 5.3.5.3.4 Sign experimenters in and out when they are AT the gate.
- 5.3.5.3.5 Require the experimenter to show you their CA key and to tell you their name.

WARNING:
THE PASS OPERATOR SHALL OBSERVE THE GATE VIDEO DURING THE SIMULTANEOUS RELEASE. Piggy backing is allowed for up to two persons. The OC shall approve additional the piggybacking by additional persons.

5.4 Hand Reader Failure

- 5.4.1 IF the Hand Reader Fails to release a CA key to a user THEN,
- 5.4.2 The OC shall send an operations group member who is enrolled in the hand reader database to verify the operation of the hand reader.
- 5.4.3 IF the hand reader works for the operations group member THEN re-enroll the experimenter with the “problem hands”
- 5.4.4 OC shall obtain hand reader bypass key from the QA Lockbox according to [C-A OPM 4.74 “Use of Alternative to ID3D-R Hand Reader”](#)
- 5.4.5 OC shall instruct the gate watch to follow [C-AD OPM 4.74](#) to release CA keys from the keytree.

- 5.4.6 Have local gate watch release the CA keys from keytree using bypass key in the “keytree bypass switch” located to the right of the key tree.
- 5.5 In the case of fire or other emergency in the U downstream enclosure the OC shall:
 - 5.5.1 Turn off the critical devices (psuarc4 and SMH10) for Udn
 - 5.5.2 Contact E963 to determine their requirements -- whether they need to enter to cover the object
 - 5.5.3 IF E963 requires entry THEN
 - 5.5.4 Contact the CAS group to respond to UGE3
 - 5.5.5 Set the enclosure to Restricted Access
 - 5.5.6 Instruct "Support One" to open the gate with a zero key and accompany the experimenter and act as a Safety Watch.

Note:

The Safety Watch shall ensure that the experimenter does not put himself/herself in harms way during the emergency.

6.0 Documentation

- 6.3 [C-A OPM Att 4.1.f “CA Gate Security Log Sheet for Remote Access.](#)

7.0 References

- 7.1 [C-A- OPM 4.56 Att ae “U downstream Sweep Checklist”](#)
- 7.2 [C-A-OPM 4.1 Procedure for Entry into Primary Radiation Areas Under Controlled Access Conditions](#)
- 7.3 [C-A-OPM 4.44 Operation of PASS](#)
- 7.4 [C-A OPM 4.75 “Entry Procedure for the Proton Radiography Experiment using the ID3D-R Hand Reader.](#)
- 7.5 [C-A OPM 4.74 “Use of Alternative to ID3D-R Hand Reader”](#)
- 7.6 [C-A OPM Att 4.1.f “CA Gate Security Log Sheet for Remote Access”](#)

8.0 Attachments

- 8.1 Temporary U downstream Sweep Checklist

TEMPORARY U DOWNSTREAM SWEEP CHECKLIST

Team leader _____ Operator 2 _____

E963 Collaborator _____

Time: _____ Date: _____

Warning:

ONCE A SWEEP IS COMPLETE, ANY WORKER LEFT IN THE ENCLOSURE MUST HAVE A CA(EB005) KEY.

IF any personnel are encountered during the sweep, **THEN** determine whether their work will be completed in a short time. **IF** the work will take a long time, **THEN** contact the OC to see if the sweep should be aborted or the workers asked to leave to obtain a CA(EB005) key. **IF** the work will be completed in a SHORT time, **THEN** write the name(s) of the workers at the end of the checklist and verify that they leave the enclosure **WITH** the sweep team.

Prerequisites

Three persons to perform the sweep (one a "Q" cleared E963 collaborator) **THE THIRD PERSON IS NEEDED IF THE TEST OBJECT IS IN THE TUNNEL – CHECK WITH THE EXPERIMENTER BEFORE SWEEPING.**

Temporary U Downstream Sweep Checklist for C-AD-TPL 03-09-ATT 8.1 (one sheet – 2 pages)

Required Tools: at least one flashlight,

Personal TLD,

Keys: Controlled Access (EB005) Sweep/Reset (EB004) keys, and special user managed key for weather doors.

Check

- ____ 1. Team Leader contacts MCR to verify that U Downstream is on Controlled Access AND that gate UG11 is RESET.
- ____ 2. IF UG11 was found to be NOT RESET (step 1) then abort the sweep, RESET it, and continue.

Note:

To RESET UG11, U Upstream must be swept per C-AD OPM-ATT. 4.56.x.

- ____ 3. Sweep Team goes to U Downstream gate (UGE2).
- ____ 4. Team Leader requests simultaneous release from MCR.

Note:

The Operator in the MCR must hold the UGE2 gate release on the PanelView until the gate is closed.

- ____ 5. Team leader opens UGE2 gate by turning the CA(EB005) in the OPEN key-switch while Operator in MCR presses simultaneous release for gate UGE2.
- ____ 6. Team Leader radios operator in MCR to report they have entered and the gate is closed.
- ____ 7. Sweep Team walks through the labyrinth to the W line.
- ____ 8. Sweep Team crosses under the **W** line and walks to the personnel door at U/W Crotch/Vertex.
- ____ 9. E963 Collaborator opens/unlocks personnel door at U/W Crotch/Vertex
- ____ 10. E963 Collaborator enters U line first to cover the object if not already covered

CONTINUED ON REVERSE SIDE

- ___ 11. Sweep Team walks downstream to the end of the U line
- ___ 12. Operator #2 starts the sweep by resetting the check station 1 at the extreme downstream end of the U line with the S/R(EB004) key in the SWEEP key switch.
- ___ 13. Observe the AREA SECURED amber lamp light for two seconds.
- ___ 14. Sweep Team sweeps upstream to the UGE3 labyrinth
- ___ 15. Team Leader stands static watch in the U line at the entrance to the UGE3 labyrinth.
- ___ 16. Operator #2 walks to UGE3 at the end of the labyrinth.
- ___ 17. Operator #2 resets the check station 2 at inside of UGE3 with the S/R(EB004) key in the SWEEP key switch.
- ___ 18. Observe the AREA SECURED amber lamp light for two seconds.

Note:

The Operator will use the special user managed key to open the weather doors and return to the U Line.

- ___ 19. Operator #2 sweeps out the labyrinth to the U line and rejoins Team Leader.
- ___ 20. Sweep Team Sweeps Upstream and out the personnel door to the Crotch/Vertex where U and W line are joined.
- ___ 21. E963 Collaborator closes/locks personnel door at U/W crotch
- ___ 22. Team Leader stands static watch at U/W crotch.
- ___ 23. Operator #2 walks downstream in the W line to the end at gate UED1.
- ___ 24. Operator #2 resets gate UED1 with the S/R(EB004) key in the RESET key switch.
- ___ 25. Observe the Gate SECURED amber lamp light, if the gate previously was not reset.
- ___ 26. Operator #2 resets check station number 3 inside UED1 with the S/R(EB004) key in the SWEEP key switch.
- ___ 27. Observe the AREA SECURED amber lamp light for two seconds.
- ___ 28. Operator #2 sweeps out the labyrinth to the W line and checks on top shield blocks.
- ___ 29. Operator #2 sweeps upstream to the U line and rejoins team leader.
- ___ 30. Operator #2 walks upstream in the U line to the UGI1 gate.
- ___ 31. Operator #2 resets check station number 4 at UGI1 with the S/R(EB004) key in the SWEEP key switch.
- ___ 32. Observe the AREA SECURED amber lamp light for two seconds.
- ___ 33. Observe the AREA SECURED amber lamp is lit for U upstream
- ___ 34. Operator #2 sweeps upstream to U/W Crotch and rejoins Team Leader.
- ___ 35. Sweep Team sweeps out the labyrinth to gate UGE2.
- ___ 36. Operator #2 ends the sweep by resetting check station number 5 inside UGE2 with the S/R(EB004) key in the SWEEP key switch. Observe AREA SECURED light will light.
- ___ 37. Team Leader calls an operator in the MCR for a simultaneous release before opening UGE2.

Note:

The Operator in the MCR must hold the UGE2 gate release on the PanelView until the gate is closed.

- ___ 38. Sweep Team sweeps through UGE2 after operator in MCR gives the release.
- ___ 39. Team Leader radios operator in MCR to report UGE2 is closed.
- ___ 40. Observe the AREA SECURED amber light will remain lighted.
- ___ 41. Team Leader confirms with an operator in the MCR that the sweep is OK.
- ___ 42. Sweep Team (at conclusion of all sweeps) returns to MCR.
- ___ 43. Capture CA (EB005) and S/R (EB004) keys in the key tree.
- ___ 44. Reset Gates UGE3 and UGE2 in MCR.
- ___ 45. Confirm Gates UGE3 and UGE2 are reset using PanelView.
- ___ 46. Team Leader files completed checklist in FY\nn Sweep Log binder

